



# IMPACT OF TROOP DENTAL HEALTH ON COMBAT READINESS<sup>1,2</sup>

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## IMPACT OF TROOP DENTAL HEALTH ON COMBAT READINESS

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The dental needs of troops during combat is a major concern of military dental providers. Dental readiness refers to the dental health of troops sent to combat and the availability of dental personnel and equipment to provide dental care in the field. This study describes the dental health needs of six hundred soldiers, and reports on the incidence of dental emergencies experienced by those soldiers during a five month non-combat deployment. The accuracy of examining-dentists in identifying soldiers who are most likely to experience a dental emergency is also reported.

Technologic, economic, and political changes during the past decade have required changes in Army doctrine. The Airland Battle concept identifies the need to be able to deploy troops rapidly, engage in combat immediately, and fight a sustained battle for thirty days or more. The requirement to deploy rapidly necessitates that an austere force be employed. The size of combat support units needed to perform their missions must be kept to a minimum, allowing maximum deployment and resupply of combat units.

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Dental emergencies reduce the effectiveness of military personnel under both peacetime and combat conditions.<sup>1-3</sup> Time lost from duty during combat as a result of dental emergencies is increased by long distances to treatment facilities and limited transportation resources.<sup>4</sup> The importance of soldiers being able to fight without experiencing dental problems as well as constraints on the early deployment of dental units make it extremely advantageous for all troops subject to deployment to be dentally prepared for any contingency.

#### METHOD

On March 18, 1982, 617 troops of the 1st Battalion, 505th Infantry Regiment(Airborne) deployed from Fort Bragg, North Carolina to the Sinai Peninsula, Egypt, as part of the Multinational Force and Observers. During the five months prior to deployment an intensive program was conducted to improve the dental health of the troops being deployed. Dental examination of 602 soldiers allowed their dental status to be classified in one of three categories. Prospective data for this study consisted of a listing of each soldier's dental category at the time of deployment. Dental categories used were: Category A - No dental care needed; Category B - Needs routine dental care; and Category PE - High potential for dental emergency within one year. Dental conditions which were considered to have a high emergency potential included any tooth indicated for endodontic treatment, non-restorable teeth indicated for extraction, carious teeth with a history of acute symptoms or caries within one millimeter of the dental pulp, third molars with a history of pericoronitis, and soldiers with untreated periodontal disease.

Accurate records were kept during the 154 days of deployment of the number of troops in the study population and the dental emergencies they experienced. The deployment involved non-combat duty with approximately one-third of the force in the field and the remainder in a garrison-like compound. Geographic restrictions inherent in the mission, the relatively small size of the force, and local security measures allowed a precise daily record of the study population size to be kept. The same factors restricted the availability of dental care to one provider at a designated location thereby ensuring the identification of any soldiers seeking emergency dental care. Each soldier reporting to the health facility for dental care was screened by the dentist to determine if a dental emergency existed. An emergency dental patient was defined as a patient presenting for treatment with symptoms of pain, loss of function, or sufficient psychological concern to cause him to seek or be referred for emergency dental treatment.

A thirty-item study survey form was completed at the time of examination on each dental emergency patient. Data collected included date of visit, identification of the soldier, demographic data, duration of complaint, dental condition causing complaint, treatments rendered, disposition of patient, the patient's dental category, and whether the condition was potentially preventable. The patient's permanent dental record was available to help determine if the condition causing the complaint had been recently treated or indicated for treatment. Data obtained from the study survey forms were compiled and analyzed for statistical significance.

## RESULTS

Thirty-nine dental emergencies were experienced by thirty-five individuals during deployment. The number of soldiers in each dental category and the rate of dental emergencies experienced by soldiers in each category are shown in Table I. An overall emergency rate of 160 dental emergencies per thousand troops per year was experienced by the deployed soldiers. The extensive dental treatment received by the troops prior to their deployment must be considered when interpreting these results.

Dental conditions diagnosed as responsible for emergency visits are listed in Table II. All cases of pericoronitis involved mandibular third molars. Gingival inflammation other than pericoronitis was a secondary causative factor in eight dental emergencies but was not the primary condition diagnosed in any emergency. Only one patient was reappointed for additional treatment required by a dental emergency, and that suture removal was considered a dental emergency visit. No dental patients required hospitalization or further evacuation.

Primary and adjunctive treatments rendered to dental emergency patients are reported in Table III. The prescription of medication was the most frequently rendered treatment for dental emergency conditions. Extraction was the most frequent definitive (primary) treatment for dental emergencies. At the time of emergency treatment a judgement was made as to whether the condition precipitating the emergency could realistically have been treated in a way that would have prevented the emergency. Thirteen dental emergencies (33.3%) were determined to be non-preventable and twenty-six emergencies (66.7%) were judged to be potentially preventable with proper diagnosis and treatment.

The distribution of dental emergencies during the 154 days of deployment is shown in Figure I. Ten of the eleven two-week intervals displayed a range of two to four dental emergencies while nine dental emergencies were experienced during the two week interval in the middle of the deployment.

#### DISCUSSION

The incidence rate of dental emergencies during the Sinai deployment was 160 emergency visits per thousand troops per year. This statistic should only be compared to other studies with the understanding that the Sinai population had received extensive dental treatment prior to deployment. The thirty-nine emergencies recorded during the Sinai peacekeeping mission were "non-battle" dental emergencies and therefore represent only a portion of the dental emergencies which might be expected under combat conditions.

The five and one-half months of the Sinai deployment represent one of the longest studies of dental emergencies during a non-combat field exercise. The fairly steady rate of dental emergencies during deployment depicted in Figure I is noteworthy. The data indicates that the dental health of the soldiers did not deteriorate significantly during the deployment despite the lack of routine dental care. Troops in the Sinai did have adequate opportunity for maintaining oral hygiene and combat stress was not a factor. Results of this study indicate that the dental health of a troop population prior to deployment will be a significant determinant of the health of the force for an extended period.

The incidence of dental emergencies experienced by soldiers not requiring any dental treatment (Category A) is an approximation of the non-combat dental emergencies which could be expected in a troop population with no dental treatment required. During the Sinai deployment seven Category A soldiers experienced a dental emergency resulting in an incidence rate of 67 dental emergencies per thousand troops per year. The incidence rate of seventy dental emergencies per thousand per year is an indication of the minimum rate of dental emergencies which could be expected with ideal dental health of all troops.

During the Sinai deployment each dental emergency was evaluated subjectively as being preventable or non-preventable. Thirteen (33.3%) of the thirty-nine dental emergencies experienced during deployment were determined to be "non-preventable" with reasonable dental care. Non-preventable dental conditions included fractured teeth which otherwise appeared sound, fractured restorations, restored teeth which required endodontic treatment, and the results of traumatic injuries. Thirteen non-preventable dental emergencies from the sample population represents an incidence rate of 53 non-combat dental emergencies per thousand troops per year. This rate is comparable to the non-preventable emergency rate of 43 dental emergencies per thousand troops per year reported by Payne and Posey during a non-combat field exercise.<sup>1</sup> Sixty-seven percent of dental emergencies during the study were determined to have been preventable if reasonable dental treatment had been accomplished prior to deployment.

Comparison of the incidence of preventable dental emergencies between the three dental treatment categories in which the soldiers were placed prior to



deployment provides some insight into the potential benefits of dental treatment in reducing non-combat dental emergencies. Table IV indicates the incidence of preventable dental emergencies by dental category. Soldiers in the potential emergency category experienced preventable dental emergencies at seventeen times the rate of soldiers with no dental treatment required. Among Category PE patients, only two of the fifteen dental conditions which resulted in preventable dental emergencies had not been indicated for treatment at the time of examination. If only soldiers requiring dental treatment at the time of deployment are considered, the soldiers diagnosed as having potential emergency conditions reported for emergency treatment seven times as frequently as soldiers requiring only routine care.

The benefit of treating potential emergency conditions is even greater than the previous group statistics would indicate. Only a fraction of the total dental treatments required by potential emergency category soldiers are for potential emergency conditions. Once the potential emergency conditions have been treated, these soldiers can be expected to have approximately the same number of preventable dental emergencies as other soldiers requiring only routine care.

A retrospective collection of data from dental records indicated that 1459 dental conditions were indicated for treatment at the time of deployment of which 157 were classified as potential emergency conditions. Thirteen of the 157 potential emergency conditions resulted in an emergency visit while the remaining 1302 routine treatments were associated with five emergency visits. Potential emergency conditions were associated with dental emergency visits during deployment twenty-one times as frequently as

conditions indicate for routine treatment. This statistic would suggest the value of priority treatment for potential emergency conditions.

Dental emergencies experienced during the Sinai deployment permit evaluation of the potential emergency criteria utilized during the predeployment treatment program. Eight cases of pericoronitis were responsible for dental emergency visits but only one of the mandibular third molars involved was indicated for extraction. This experience indicates that all third molars exposed to oral fluids and partially covered by soft tissue should be closely evaluated as possible potential emergency conditions. Evaluation of carious lesions indicates that caries within two millimeters of the pulp would be a conservative criteria for non-symptomatic teeth. Teeth requiring endodontic treatment are a significant source of dental emergencies.

#### SUMMARY

Six hundred soldiers were given dental examinations before a twenty-two week non-combat deployment to an isolated area. The dental examinations included identification of dental conditions which the examiner felt had a high probability of precipitating a dental emergency within one year. During the deployment a record was kept of soldiers reporting for treatment of dental emergencies and a survey form was completed at the time of each treatment. Data obtained during the examinations and during deployment were analyzed to determine the incidence of dental emergencies, casual factors, and to compare the emergency experiences of soldiers with potential dental emergency conditions to soldiers needing only routine dental care and those not requiring dental treatment.

The following results were obtained from this study:

1. Thirty-nine dental emergencies were experienced for an incidence rate of 160 dental emergencies per thousand troops per year. The major conditions resulting in dental emergencies were caries (33%), pericoronitis (21%), and trauma (10.3%). Two-thirds of the dental emergencies were considered to have been preventable with conservative dental treatment.
2. The incidence rate of preventable emergencies was ten times as great among soldiers classified as having potential emergency conditions when compared to those soldiers not having potential emergency conditions.
3. One fifth of the soldiers diagnosed as having potential emergency conditions reported for treatment of a preventable emergency during the five and a half months of deployment.
4. Potential emergency conditions for which treatment was indicated were associated with dental emergency visits twenty-one times more frequently than dental conditions for which routine care was indicated.

Dental emergencies are a military problem whether they occur during training or combat. This study indicates that potential dental emergency conditions can be accurately identified during routine dental examinations and that potential emergency conditions result in a significant percentage of preventable dental emergencies.

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# TABLE I

## RATE OF DENTAL EMERGENCIES BY DENTAL CATEGORY

DENTAL CATEGORY	AVERAGE TROOPS PER DAY	DENTAL EMERGENCIES	EMERGENCY RATE PER 1000 TROOPS PER YEAR
A	247	7	67
B	260	16	145
PE	72	16	530
TOTALS	579	39	160

# TABLE II

## INCIDENCE OF DENTAL EMERGENCIES BY PRESENTING DIAGNOSES

DIAGNOSIS	INCIDENCE	PERCENT OF EMERGENCIES
CARIES	8	20.5
PERICORONITIS	8	20.5
PERIAPICAL ABSCESS	5	12.7
FRACTURED TOOTH	4	10.2
DEFECTIVE RESTORATION	3	7.7
ENDODONTIC COMPLICATION	3	7.7
PERIODONTAL ABSCESS	3	7.7
TRAUMATIC ULCER	1	2.6
SIALADENITIS	1	2.6
OCCLUSAL TRAUMA	1	2.6
SOFT TISSUE LACERATION	1	2.6
SUTURE REMOVAL	1	2.6
TOTAL	39	100.0

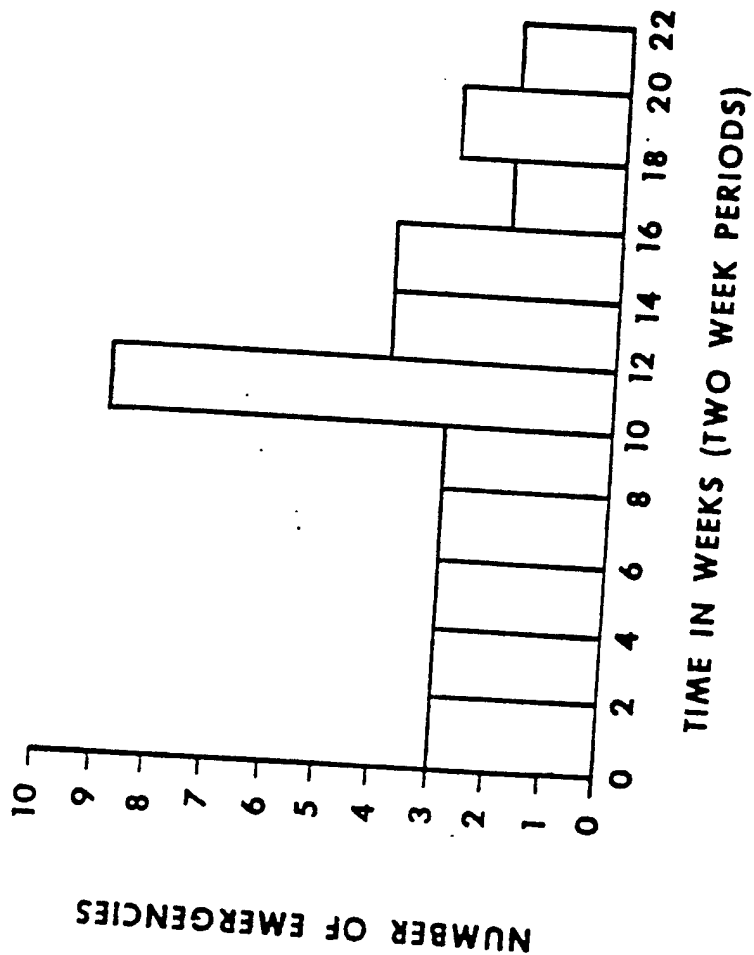
# TABLE III

## FREQUENCY OF TREATMENT RENDERED FOR DENTAL EMERGENCIES

TYPE OF TREATMENT RENDERED	PRIMARY TREATMENT		ALL TREATMENT	
	FREQ.	%	FREQ.	%
AMALGAM/RESIN RESTORATION	5	12.8	5	7.5
TEMPORARY RESTORATION	3	7.7	5	7.5
EXTRACTION	14	35.9	14	20.9
PULP TREATMENT	8	20.5	8	11.9
PERIODONTAL TREATMENT	4	10.2	12	17.9
PRESCRIPTION	3	7.7	21	31.3
SUTURE	1	2.6	1	1.5
POST-OPERATIVE TREATMENT	1	2.6	1	1.5
TOTAL	39	100.0	67	100.0

FIGURE 1

**FREQUENCY DISTRIBUTION OF DENTAL EMERGENCIES**





# TABLE IV

## INCIDENCE OF PREVENTABLE DENTAL EMERGENCIES BY DENTAL CATEGORY

CATEGORY	PREVENTABLE EMERGENCIES	NUMBER OF TROOPS	INCIDENCE RATE*
A	3	247	29
B	8	260	73
PE	15	72	497
TOTAL	26	579	106

\*INCIDENCE RATE PER THOUSAND TROOPS PER YEAR